



# **Bayport Energy Center Thermally Balanced Combined Heat & Power**



**Nations Energy Holdings, LLC**

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- ◆ **Combined Heat & Power is an effective method for emissions compliance, operating cost reduction, and improved reliability at energy intensive industrial sites**
- ◆ **Bayport Energy Center**
  - Approach**
    - Thermally balanced
    - Highly integrated with site host
  - Result**
    - Boiler NOx emission reduced by 80%
    - Steam energy cost reduction
    - Electricity cost reduction

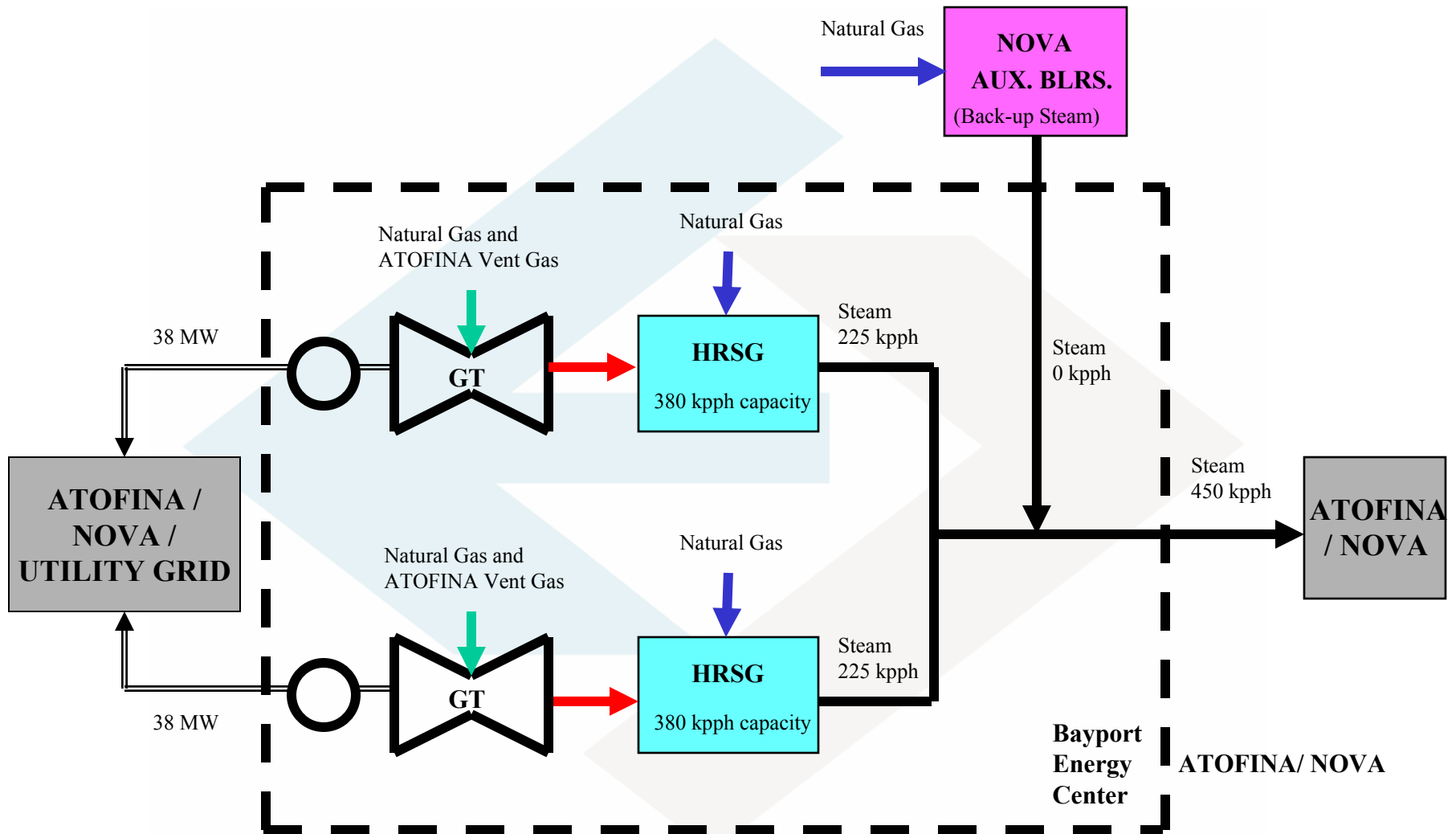


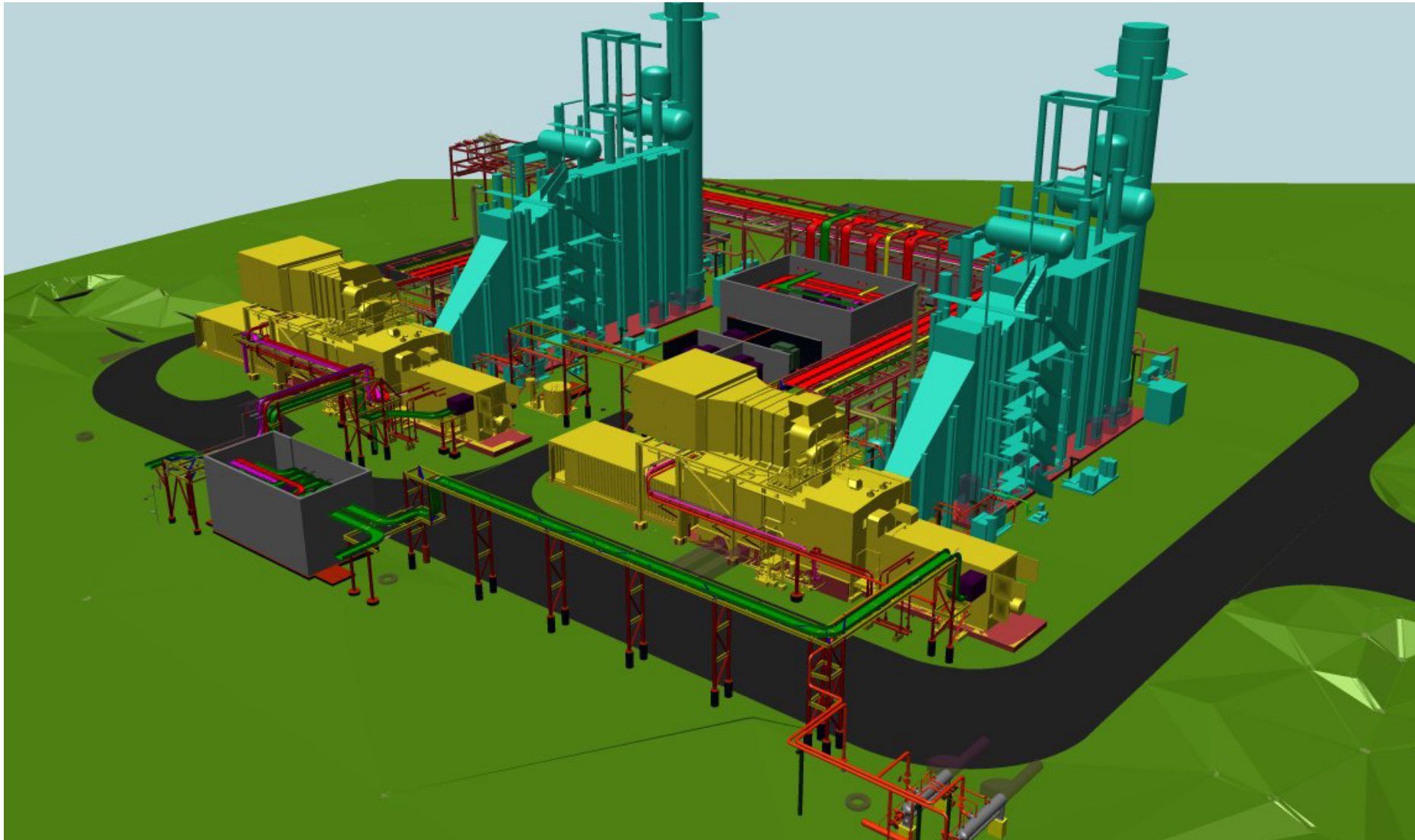
- ◆ Nations Energy is a developer, owner, and operator of Combined Heat & Power (CHP) projects in North America
- ◆ Headquartered in Chicago, IL
- ◆ Primary focus on refining, chemical, and paper industries
- ◆ Nations approach is to focus on the site host energy requirements, integrate with existing operations, and use existing infrastructure to reduce capital expense and maximize savings



- ◆ Nations Energy will construct, own, and operate a 76 MW<sub>e</sub> / 140 MW<sub>t</sub> gas turbine Combined Heat & Power facility in Pasadena, TX
- ◆ Steam and power will be supplied to NOVA Chemicals Inc. an ATOFINA Petrochemicals, Inc. who operate chemical production facilities at adjacent sites
- ◆ NOVA and ATOFINA will purchase more than 85% of the total steam and electric energy generated at the facility under long-term energy service agreements
- ◆ **Schedule**
  - Construction Start – 3rd Quarter 2003
  - Commercial Operation – 4<sup>th</sup> Quarter 2004

# Equipment Configuration







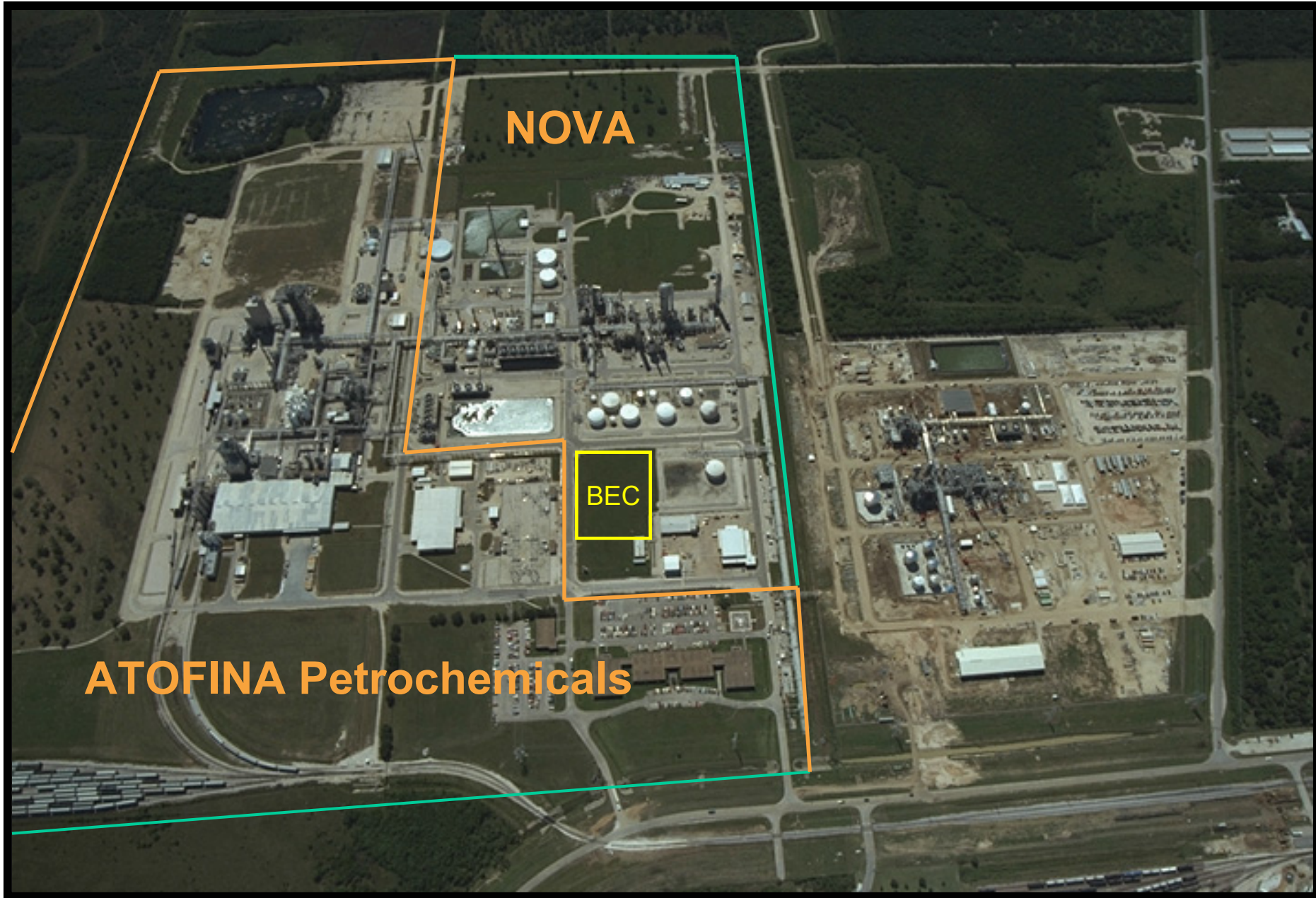
- ◆ **Project is thermally balanced to meet the on-site steam and electric demand of the site hosts**
  - **No condensing steam turbine – steam load demand swings will be met with HRSG duct burners**
- ◆ **Independent/redundant gas turbine HRSG trains – each gas turbine HRSG train can supply the normal steam and electric demand requirements of the hosts with minimal back-up**
- ◆ **This approach results in a thermally efficient, highly reliable, and capital efficient design**
  - **Electricity generated at less than 6000 Btu/kWh heat rate**



# NOVA/ATOFINA Sites





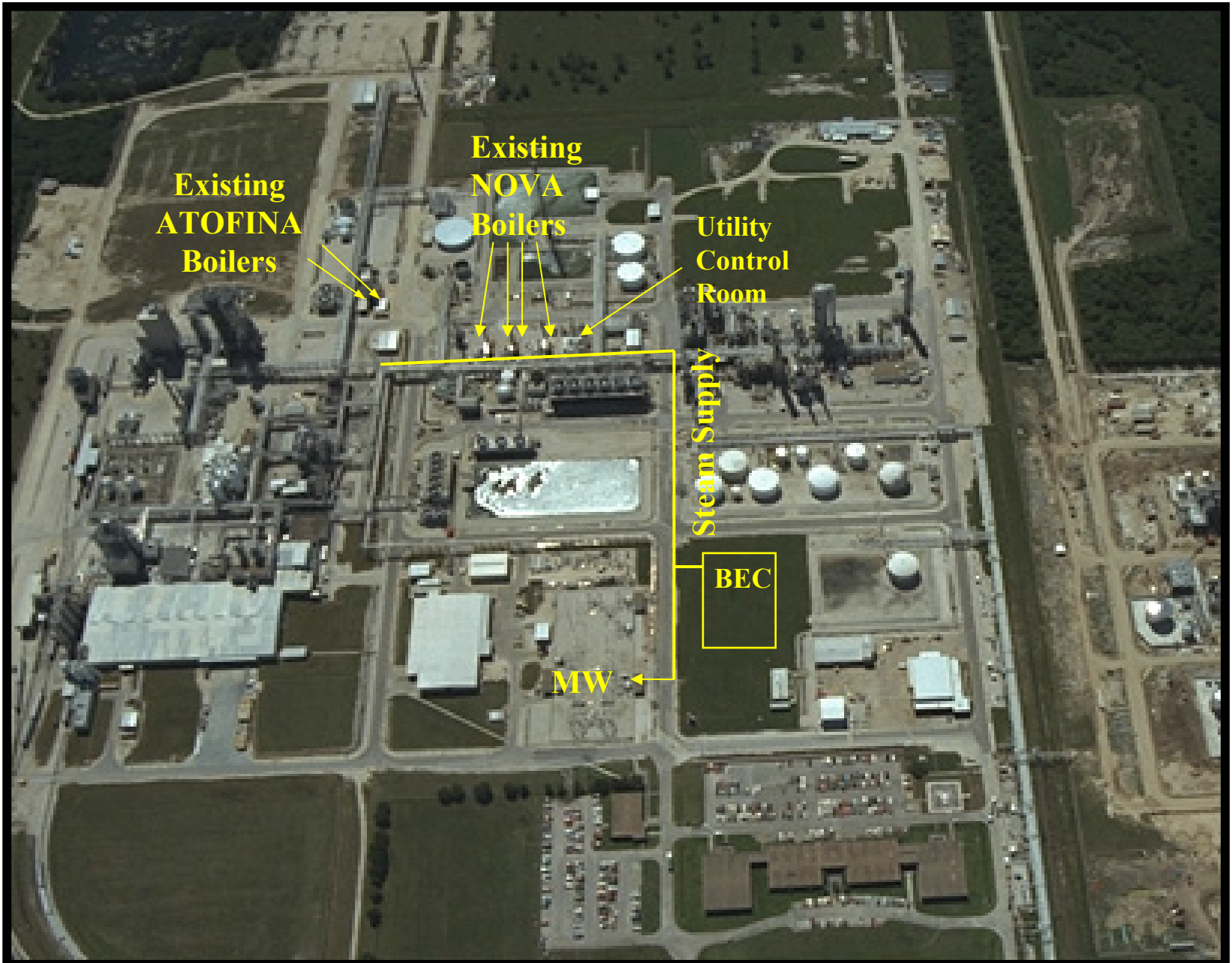


**NOVA**

**BEC**

**ATOFINA Petrochemicals**

# Bayport Energy Center - Integration

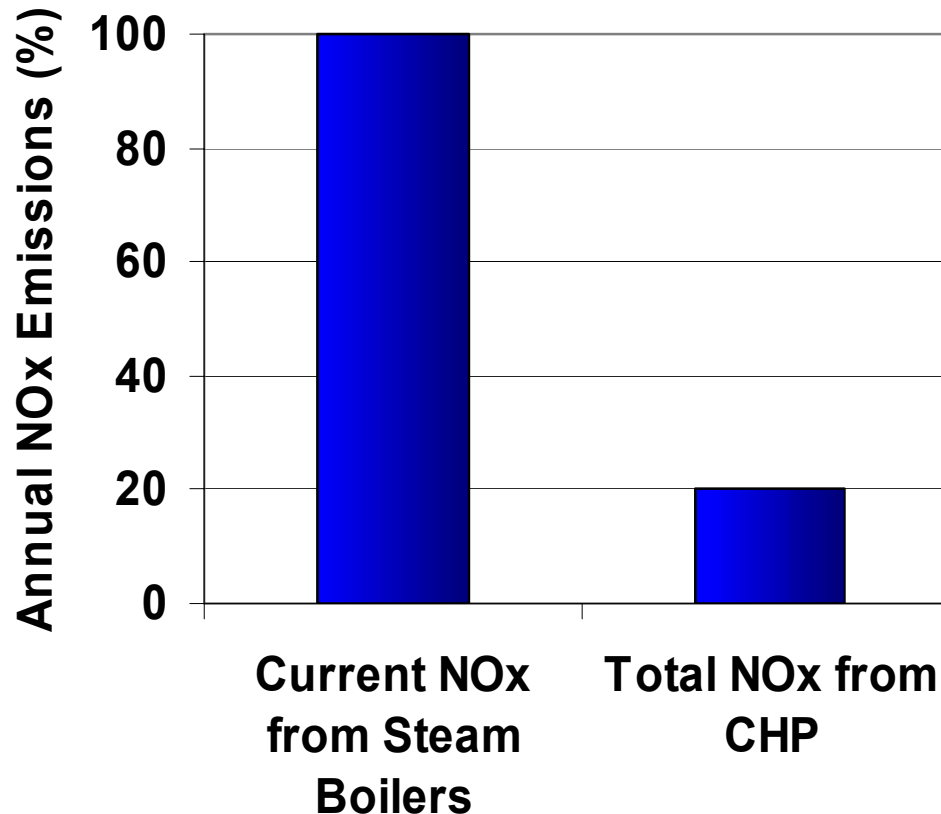




- ♦ **Nations will operate and maintain NOVA's existing boilers to ensure a continuous supply of steam**
  - Back-up steam supply to CHP plant
  - Boilers will burn process waste fuel as required
  
- ♦ **Plant management will be provided by Nations with operations personnel leased from NOVA**
  
- ♦ **Other site utilities are integrated with the host**
  - Nations will take over operations and maintenance of the water treatment facilities for water needs of the CHP project and NOVA/ATOFINA
  - The Project will burn a waste gas fuel from ATOFINA in the combustion turbines
  - Control room for the Project will be located within the existing NOVA control room for seamless integration with host operations



- ♦ **The total NOx emissions associated with steam supply will be reduced by more than 80% with the addition of the Project**
  - Four gas fired boilers will be shut-down
  - Two boilers will be kept available for back-up steam supply





- ◆ **Gas turbine/HRSG will include an SCR NO<sub>x</sub> reduction system for a NO<sub>x</sub> emission rate of less than 2.5 ppm @ 15% O<sub>2</sub>**
- ◆ **Project was a key element of NOVA and ATOFINA's strategy for compliance with the NO<sub>x</sub> SIP call for the Houston-Galveston severe non-attainment region**
- ◆ **Hosts are providing the necessary NO<sub>x</sub> allowances for the Project, which are made available by the shutdown of existing boilers**





- ♦ **CO<sub>2</sub> emissions are potentially reduced by greater than 90,000 tons/year**
  - Due to increase in efficiency of steam production; and
  - Assuming displaced power generation sources are 45% efficient (~ 7500 Btu/kwh Heat Rate)
- ♦ **Market is developing to assess the value of these reductions**
  - \$1 - \$20 per ton potential range of CO<sub>2</sub> value based on current views of the market

**Industry is starting to take a proactive approach to voluntary reductions in CO<sub>2</sub> emissions to avoid onerous state and federal regulations.**



- ◆ Emissions reduction and compliance with NOx regulations
- ◆ Improved reliability of steam/electricity supply
- ◆ Avoided capital costs for new emissions controls and/or new steam generation equipment
- ◆ Steam savings - cogenerated steam is more efficient than stand alone boilers
- ◆ Power Savings - avoided power costs are based on a predominantly gas market in ERCOT
- ◆ Outsource of energy supply to an experienced operator

**The time is right for well executed, thermally balanced Combined Heat & Power as a long-term solution to energy supply at industrial sites.**